



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

APR 10 2003

OFFICE OF  
PREVENTION, PESTICIDES AND  
TOXIC SUBSTANCES

Mr. John D. Rind, Senior Consultant  
Alcoa EHS Services North America  
201 Isabella Street at 7<sup>th</sup> Street Bridge  
Pittsburgh, PA 15212-5858

Dear Mr. Rind:

Your letter of March 28, 2003, requests an extension of the Alcoa Technical Center (ATC) long-term, land-treatment unit (LTU) PCB biodegradation studies at the Massena, New York facility. The National Program Chemicals Division (NPCD) of the U.S. Environmental Protection Agency (EPA) extends ATC's R&D approval to May 1, 2004. The R&D studies center on evaluating the effectiveness of biological degradation of PCBs and polycyclic aromatic hydrocarbons (PAHs) in land treatment units (LTUs) on a long term basis. In the LTUs, water and nutrients are added to simulate natural biodegradation. Initially, these tests at the Massena facility were expected to last ten years, ending in the year 2005. However, Alcoa has determined there is value in maintaining the LTUs until the year 2020.

This approval limits the testing of PCB contaminated material for the biodegradation studies for any one project to no more than 200 pounds of soil and/or sludge ranging in concentrations up to 2,000 ppm PCBs; no more than 100 gallons of water in concentrations up to 100 ppm PCBs; and no more than two liters of oil in concentrations no more than 5,000 ppm PCBs. This R&D approval renewal is granted pursuant to Section 6(e)(1) of the Toxic Substances Control Act of 1976 (TSCA), Public Law No. 94-469, and the Federal PCB Regulations, 40 CFR 761.60(e) (48 Federal Register, 13185, March 30, 1983) (Alternate Method) and 40 CFR 761.60(j)(1)(iii). This is not a final approval to dispose of PCBs.

The handling, storage, and disposal of wastes from this project will be based on the PCB content of their original source of PCB contamination in accordance with the TSCA regulations. In this case, source is defined as the PCB material received at ATC from off-site Alcoa locations for treatability testing. Wastes generated from the tests must be disposed of in an EPA-approved PCB incinerator (40 CFR 761.70) or in an EPA-approved chemical waste landfill (40 CFR Part 761.75).

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CONCURRENCES

|         |          |        |        |  |  |  |  |  |
|---------|----------|--------|--------|--|--|--|--|--|
| SYMBOL  | 7404T    | 7404T  | 7404T  |  |  |  |  |  |
| SURNAME | Dodohara | Br     | Look   |  |  |  |  |  |
| DATE    | 4/8/03   | 4/8/03 | 4/8/03 |  |  |  |  |  |

A status report summarizing progress of the project since the inception of the studies in 1994, indicating improvement in the PCB content of the test matrices, shall be submitted to the National Program Chemicals Division (NPCD) no later than 90-days after receipt of the analysis from each sampling event performed by ATC personnel. Please direct all official correspondence concerning this approval to me or contact Hiroshi Dodohara of my staff at (202) 260-3959 for answers to any technical questions which may arise.

Sincerely,

A handwritten signature in black ink, appearing to read "Brion T. Cook".

Brion T. Cook, Acting Director  
National Program Chemicals Division

Enclosure

cc:

Kelly Bunker  
Region III

Daniel Kraft  
Region II

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
APPROVAL TO CONDUCT RESEARCH AND DEVELOPMENT TESTS  
TO DISPOSE OF POLYCHLORINATED BIPHENYLS (PCBS)

ALUMINUM COMPANY OF AMERICA  
ALCOA TECHNICAL CENTER  
ALCOA CENTER, PENNSYLVANIA

R&D STUDIES TO DETERMINE THE EFFECTIVENESS  
OF ENHANCED BIOLOGICAL DEGRADATION  
FOR PCB-CONTAMINATED MATRICES  
PURSUANT TO 40 CFR 761.60(e) AND (j) FOR AUTHORIZED CONTINUED USE

BACKGROUND

On May 1, 1993, Alcoa submitted a request to conduct research and development (R&D) on the enhancement of biological degradation of PCB-contaminated waste matrices belonging to ALCOA and located in its Alcoa Technical Center in Pennsylvania. These studies have been and will continue to be carried out in controlled laboratory settings, either directly by or under the supervision of trained, Alcoa technical personnel. On September 9, 1998, Alcoa requested an R&D approval to determine the effectiveness of certain cleaning and coating techniques on concrete floor core samples from the Vernon, California plant. Alcoa requested approval on April 1, 1999, to test additional concrete floor core samples from the Massena, New York plant. These studies were completed and the final report was submitted to EPA on September 24, 2001.

This approval is issued to the Aluminum Company of America (Alcoa), Alcoa Center, Pennsylvania, to conduct research and development (R&D) on the enhancement of biological degradation of PCB-contaminated waste matrices belonging to Alcoa.

Authority

This approval to conduct R&D into PCB disposal is issued pursuant to Section 6(e)(1) of the Toxic Substances Control Act of 1976 (TSCA), Public Law No. 94-469, and the Federal PCB Regulations, 40 CFR 761.60(e), (48 Federal Register, 13185, March 30, 1983) and 40 CFR 761.60(j)(1)(iii).

Effective Dates

This R&D approval will become effective on the date of signature and will expire May 1, 2004.

## Proposed Tests

### Biodegradation Research

Alcoa will study samples of solid and liquid wastes obtained from PCB-contaminated sites belonging to Alcoa to develop and evaluate techniques for the enhancement of biological technologies for later use in full-scale remediation of the contaminated sites. These studies will help determine the potential for the use of relatively low-cost biological technologies to treat PCBs to environmentally sound levels without producing adverse by-products.

Research has shown that PCBs do biodegrade in the environment and in laboratory studies, but at a very slow rate. However, no one yet has demonstrated a process to EPA that can accelerate PCB biodegradation to rates necessary to make such a process commercially viable. In addition, even though the susceptibility to biodegradation of PCBs found in soil and sludge materials has been demonstrated, treatment of all PCB congeners to below certain plateau levels has been technically unachievable. Thus, physical and/or chemical pretreatment to increase bioavailability may enhance biodegradation by lowering achievable treatment levels for all PCB congeners.

There is evidence to suggest that the bioremediation of sparingly soluble, hydrophobic organic molecules like PCBs, found in soil and sludge matrices, may be limited by the physical availability or proximity of these compounds to the microbial surfaces, rather than by the inability of the microorganisms to metabolize the compounds. If this is so, relevant physical characteristics of the PCB congeners in soils and sludges, such as adsorption/desorption rates and solubilities, can be compiled from the available literature and from laboratory studies, and projections about the rates of biodegradation of the congeners can be made from the data.

When values for aqueous solubilities, octanol-water partition coefficients, and Henry's Law constants were compiled for the PCB congeners and correlated with the level of chlorination of the PCB congeners, the results were suggestive that, as the degree of chlorination and hence the molecular weight of the PCB congeners increases, the degree of bioavailability of the congeners should decrease. In addition, the concentration of PCB congeners remaining after traditional bioremediation should reach some irreducible plateau, and the distribution of the remaining PCB congener population should have shifted towards the more highly chlorinated congeners. This parallels the findings in General Electric's Hudson River studies carried out in the summer of 1991. The lower chlorinated congeners biodegraded more rapidly, and the process stopped at low concentrations.

In the General Electric and in other PCB bioremediation studies, the residual PCB congeners, while still physically present in the soil/sludge matrix, may for all practical purposes be immobilized or biostabilized. Therefore, enhancement of the soil/sludge matrix by physical and/or chemical means, such as with the addition of surface-active agents or chemical oxidants, may increase the bioavailability of the target organics (PCBs) and lead to the attainment of lower residual concentrations. Likewise, the addition of an organic compound with a chemical structure similar to that of the contaminant may enhance and stimulate the growth of microbial populations that could readily cometabolize the target compounds. These physical and/or chemical process approaches may be applied either before or during bioremediation. They are

also compatible with the in-situ bioremediation approaches being considered by ALCOA for use in full-scale site remediations.

Alcoa plans to evaluate ways to increase PCB bioavailability and to enhance PCB biodegradation with the following research:

- soil/sludge sorption testing in combination with surfactant screening;
- chemical oxidant screening;
- soil pan degradation studies simulating land treatment;
- biological slurry reactor testing;
- fluidized carbon bed reactor studies for biologically treating wastewater; and
- adsorption/desorption testing of soil/sludge, or oil matrices to determine site-specific partition coefficients for PCB congeners.

As part of this treatability testing program, ALCOA plans to develop and improve its in-house capability for identifying and quantifying PCBs on a congener-specific basis with gas chromatography and mass spectrometry.

#### Conditions of Approval

1. Advance Notification: A thirty-day advance notice of the proposed tests must be provided to the Regional Administrator of EPA Region III, the State of Pennsylvania, and any local officials governing the site where the Alcoa Technical Center is located, and to the EPA Regional Offices, and to the state and local agencies where the sampling sites are located. These notices must briefly outline the treatability testing program, and include the approximate dates and the estimated length of the testing. A sample form is enclosed. Copies of these letters must be sent to the Chief, Fibers and Organic Branch (7404T) at EPA Headquarters, to be kept on file.

2. Other Permits and Approvals: Prior to commencing the tests, Alcoa must obtain any necessary federal, state or local permits or approvals. During the course of the testing, ALCOA shall comply with all conditions and requirements of such permits or approvals.

3. Feedstock and Restrictions: PCB- contaminated soil, sludge, water and/or oil samples used in these treatability studies will be obtained from PCB-contaminated sites owned by Alcoa, or its subsidiaries, that are located within the continental United States or its territories, and from public bodies of water adjacent to or downstream of Alcoa properties. For any one project, a maximum of approximately 150 pounds of soil and/or sludge ranging in concentration from 10 ppm to 10,000 ppm PCBs may be used. For any one project, a maximum of 100 gallons of water ranging in concentration from 1 ppb to 100 ppm PCBs may be used. For any one project, a maximum of two liters of oil ranging in concentration from 10 ppm to 5,000 ppm PCBs may be used.

Solid and liquid waste matrices used in the treatability studies will be sampled and analyzed for PCBs with gas chromatography and/or mass spectrometry at the beginning of the studies, and at intervals for the duration of the studies, until the treatment has reduced the concentration of PCB's to less than 3 parts per billion for water; 2 ppm per peak for soils, sediments and sludges; and 10 micrograms per 100 square centimeters for non-porous surfaces.

While these levels cited for the various media refer to TSCA cleanup levels, part of the treatability testing is to test various biodegradation approaches and enhancements that may not meet the cleanup levels cited. Regardless of whether the cleanup levels are attained, all material used in the studies, both treated and untreated, will be incinerated in a TSCA-approved incinerator when the studies are completed.

4. Process Waste Restrictions: All waste generated as a result of this process must be disposed of as if it contained the original concentration of the feedstock received at the Alcoa Technical Center from off-site Alcoa locations, unless through representative sampling and analysis, EPA can verify that the waste contains non-detectable concentrations of PCBs (defined as less than 2 parts per million per congener quantitated with the Dye Color Manufacturers Association [DCMA] Standard for all matrices except water, which must contain less than 3 parts per billion total).

This approval does not obligate EPA to take samples. In the event that EPA does not take samples, all PCB waste and treated residues generated during the test(s) must be disposed of by approved TSCA incineration according to 40 CFR 761.70, or by chemical waste landfilling according to 40 CFR 761.75.

5. Process Monitoring/Recordkeeping: Plans for sampling, and analysis and quality assurance are described in Alcoa's permit application on file at EPA Headquarters. Sampling and analysis will be conducted on all PCB-contaminated solid and liquid matrices used in this R&D project to establish baseline conditions, and subsequently to monitor various parameters during the project.

For the biodegradation studies, the results of all sampling, analytical, and monitoring activities must be recorded throughout the R&D activity. The results include the following:

- a. initial PCB concentration of all samples of solid and liquid matrices analyzed;
- b. final PCB concentration of all samples of solid and liquid matrices analyzed;
- c. rate(s) of PCB degradation monitored in study samples;
- d. the PCB concentration of any air samples analyzed to measure potential PCB losses through volatilization;
- e. any initial and final toxicity tests; and
- f. specific partition coefficients between soil/sludge and water, and between oil and water.

6. R&D Test Report: Alcoa shall submit a formal, final test report no later than 90 days after the completion date of studies applied to the major project scope, or after the expiration date of the permit, whichever comes first. Alcoa shall also submit annually, on the anniversary of the R&D approval, short, executive summaries of its studies to be included with Alcoa's request for permit renewal. In addition, Alcoa shall submit a status report summarizing progress of the project since the inception of the studies in 1994, indicating improvement in the PCB content of the test matrices, no later than 90-days after receipt of the analysis from each sampling event performed

by ATC personnel. All test results and related information on this R&D project shall be incorporated into the test report to be submitted to Fibers and Organics Branch (7404T) for evaluation. The R&D test reports shall include, at a minimum, the following items:

- a. Certification Letter. This letter, signed by an authorized official of Alcoa, must certify, on behalf of the applicant, that the tests were carried out in accordance with the approved conditions of this permit, and that the results of all determinations are submitted in the report. Any changes or deviations from the conditions of this permit must be authorized in advance by the permitting authority, and documented in writing in the report;
  - b. Detailed discussion of all process operations, operational problems, if any, and corrective actions;
  - c. Chronology of significant events;
  - d. Quality Assurance (QA) Report. This report should address all the QA objectives, including whether precision and accuracy objectives were met, as well as results of quality assurance samples, performance audit samples, and systems audits;
  - e. Waste Handling Documentation. Alcoa should provide documentation, such as copies of manifests and certificates of destruction, to show that all wastes generated during the operation of the study were properly disposed of according to the regulations found in the Toxic Substances Control Act (TSCA), the Resource Conservation and Recovery Act (RCRA), and the Clean Water Act (CWA). All PCB waste and treatment residues generated during the test(s) must be disposed of by approved TSCA incineration according to 40 CFR 761.70, or by chemical waste landfill according to 40 CFR 761.75.
7. Facility Inspection: EPA employees shall have access to the Alcoa laboratories during the tests for purposes of inspection, observation, or sampling. This access is subject to the normal safety requirements placed on Alcoa personnel.
8. Facility Security: The Alcoa laboratories shall be secured (e.g., fence, alarm system, etc.) to restrict public access to the area. Any personal injury occurring as a result of the R&D activities must be reported to Kelly Bunker, the EPA Region III PCB Coordinator (215-814-2177) (Fax Number 215-814-3114), by the next regular business day.
9. Safety and Health: Alcoa must take all necessary precautionary measures to ensure that the operation of the treatability studies on enhancement of PCB biodegradation comply with the applicable safety and health standards as required by federal, state, and local regulations and ordinances.
10. PCB Spills: Any spills of PCB materials shall be promptly controlled and cleaned up in accordance with the guidance given in the TSCA PCB Spill Cleanup Policy and procedures (see 52 Federal Register, 10688, April 2, 1987). In addition, a written report describing the spill, operations involved, and cleanup actions must be submitted to EPA Region III within five business days.



PCB spills must be reported in accordance with the PCB spill reporting requirements prescribed under Section 311 of the Clean Water Act for discharges to navigable waters, under the Comprehensive Environmental Response, Compensation, and Liability Act (Superfund), and any other applicable federal, state, or local reporting requirements.

11. Personnel Training: Alcoa is responsible for ensuring that personnel directly involved with handling PCBs or PCB-contaminated material during the Alcoa treatability studies are demonstrably familiar with the general requirements of this R&D approval. At a minimum, this information includes:

- a. the type of material that may be treated during the testing;
- b. basic reporting and recordkeeping requirements under this R&D approval, and the location of records at the test site;
- c. notification requirements;
- d. waste disposal requirements for process wastes generated during the treatability testing; and
- e. basic health and safety measures to be used during all treatability testing.

This R&D permit must be available upon request for use by Alcoa personnel involved with the study.

12. PCB Transport Restrictions: PCB-contaminated soil not involved in the experiment may not be transported from the Alcoa Technical Center, except for purposes of proper disposal. PCB material transported for purposes of disposal must be marked in accordance with 40 CFR Part 761.40, and the DOT requirements of Title 49 CFR Part 172. Such requirements include placarding and labeling all PCBs.

13. Process/Equipment Modifications: Any departure from the conditions of this R&D approval, or from the terms of the application submitted by Alcoa, must receive prior written-authorization from EPA Headquarters. Verbal requests must be followed within ten-working days by a written request from Alcoa describing all modifications. In this context, modifications are defined as any deviations from the permit conditions or from the data and materials that have been received by this Agency from Alcoa regarding the operation of this treatability testing program.

14. Permit Effective Dates: This R&D approval shall become effective on the date of signature and shall expire on May 1, 2004.

Each year, Alcoa may apply for a renewal of the approval within three months of the expiration date. Based on the R&D test report submitted by Alcoa at the time of the renewal application, EPA shall make a determination as to whether to renew this R&D approval.

Under the above conditions, and given the circumstances under which the R&D tests will be conducted, the National Programs Chemicals Division of EPA Headquarters finds, pursuant to

40 CFR Part 761.60(e), that these tests will not present an unreasonable risk of injury to health or the environment.

Approval to conduct R&D on the enhancement of biological degradation of PCBs and cleaning and coating techniques in contaminated matrices is hereby granted to Alcoa, subject to the conditions expressed herein, and consistent with the materials and data included in the application from Alcoa. Each party must comply with all terms and conditions of this approval, and failure to do so will be considered a violation of the PCB Rules and the Toxic Substances Control Act. This R&D approval is valid only when the research is conducted at the Alcoa Technical Center in Pennsylvania.

Sincerely,

APR 10 2003

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Date



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Brion Cook, Acting Director  
National Program Chemicals Division

## APPENDIX

### EXAMPLE THIRTY-DAY NOTIFICATION FORM

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Company Name, Address, Phone Number, and Contact Person:

Person, Organizational Affiliation/Title, and Phone Number for:

EPA Regional Contact:

State Contact:

Local (Town/City/County) Contact:

Nature of the Disposal Activity:

Kind of PCB Disposal Process:

Kinds of Material Containing PCBs:

Numbers and Sizes of Pieces of Equipment Containing PCBs:

Quantity of Solids and/or Volume of Liquids Containing PCBs:

Concentration(s) of PCBs in the Material to be Treated:

Location

Street Address or Other Identifier for All Sites:

Telephone Contact and Address for Site Manager:

Time of Processing

Date (s) :

Time (s) :